

Ground Water Geochemistry Effects

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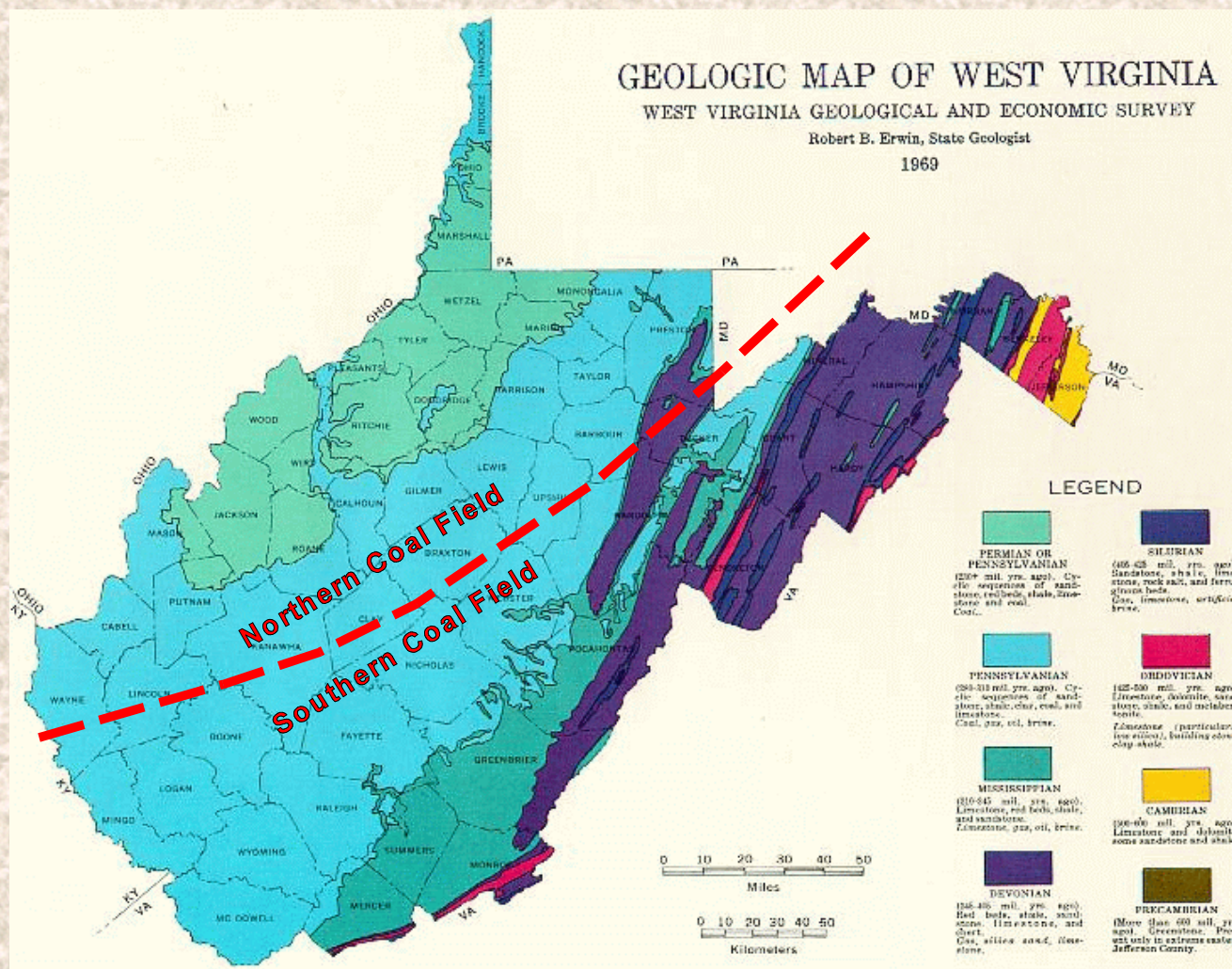
Techniques Used to Predict Postmining Water Quality

- ▶ Acid Base Accounting
 - Volume Weighted
 - Siderite Modified Testing
- ▶ Recharge to the fill areas
 - Quality and quantity of the ground water recharge to the fill areas
- ▶ Adjacent Existing Mining Operations
 - Water quality from backfills and valley fills
 - Requires demonstration that operations are similar in topography, geology, hydrology, mining methods and age, etc.

Overburden Geochemistry and Postmining Water Quality

- ▶ **WV broken into two coal coalfields based on coal quality**
 - **Northern coalfield overall has higher potential acidity (sulfur) and frequently higher neutralization potential (more limestones).**
 - **Southern coalfield overall has lower potential acidity (sulfur) and lower neutralization potential (more sandstones).**
 - **Acid Base Accounting studies conducted in hydrologic and geologic conditions representative of the Northern coalfield and provides relationship between mining methods, overburden geochemistry, and post mining water quality.**

West Virginia Coalfields



Characterization of Ground Water Quality Impacts

- ▶ Northern coalfields-generally understood that sites with higher sulfur levels that have acid discharges can have severe acid drainage problems unless substantial alkaline material exists on site.
- ▶ Southern coalfields-generally thought that sites with lower sulfur levels would likely have alkaline discharges; but without significant alkaline material can result in acidic discharges.
- ▶ Sulfates, total dissolved solids, specific conductance, and metals frequently increase as a result of mining.
- ▶ Recharge to stress relief systems frequently changed spoil water storage and discharges.

Ground Water Impacts- Watersheds

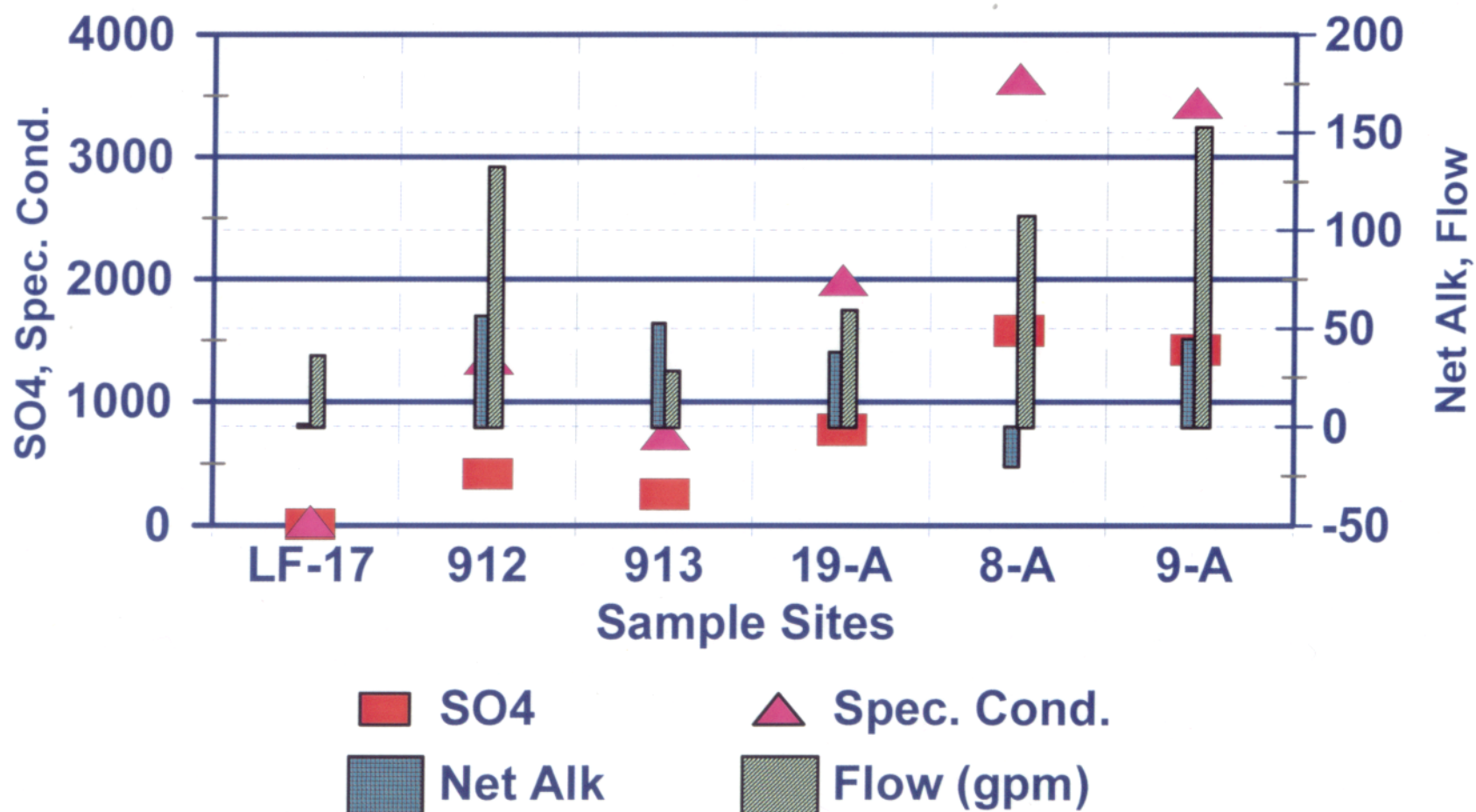
- ▶ **Recharge of spoil water to streams frequently increase sulfate, total dissolved solids, specific conductance in receiving streams especially during low flow as a result of increased base flow.**
- ▶ **Metals may increase in the receiving stream but frequently decline after mining and reclamation are completed.**

Conceivable Actions to Reduce the Uncertainty

- ▶ **Field studies of existing mining operations to relate geochemistry to postmining water quality.**
- ▶ **Better establish the ground water flow paths through mine backfills and valley fills.**

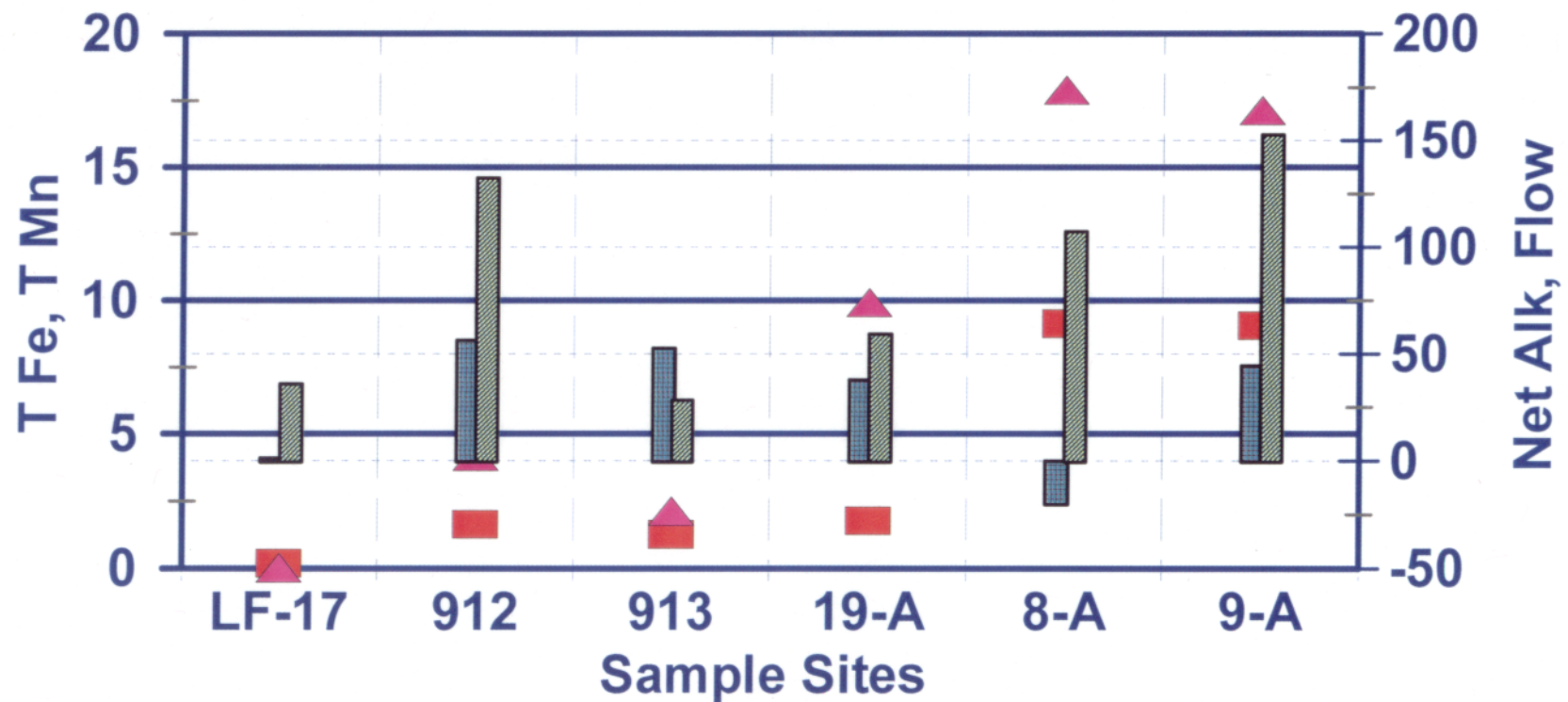
Example Ground Water Chemistry: Aquifers

Valley Fill Water Quality



Example Ground Water Chemistry: Aquifers

Valley Fill Water Quality



■ T Fe

▲ T Mn

■ Net Alk

■ Flow (gpm)